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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/574,660	05/22/2006	Manfred Renkel	GAS013	7900

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EXAMINER	
LIN, KUANG Y	
ART UNIT	**PAPER NUMBER**
1725	

MAIL DATE	DELIVERY MODE
09/18/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/574,660	RENKEL ET AL.	
	Examiner	Art Unit	
	Kuang Y. Lin	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 August 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *13-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. Claim 16 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In line 5, it recites "filling the nonferrous molten metal into the casting mold". In line 6, it recites "solidifying the **molten titanium alloy** in the casting mold". It is not clear what scope is claimed.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 60-12,247 and further in view of EP 554,198 and JP 4-300,047.

JP '224 shows to make a investment mold which comprises of a face coating layer of extra fine particles and an intermediate layer. The face coating layer and

the intermediate layer have the same thermal coefficient as the face coating layer to improve the dimensional accuracy and casting surface of a unidirectionally solidified casting. Obviously, the compositions of both layer may be substantially same composition such that they may have same thermal coefficient. The coating material for the layer is selected one or more kind of ceramic among MgO, Al_2O_3, ZrO_2, HfO_2, Y_2O_3, CaO, La_2O_3, CeO_2, BaO, and SiO_2. Thus, JP '224 substantially shows the invention as claimed except that it does not show exactly what composition is used for forming the coating layers. However, EP '198 shows that it is desirable to use magnesium oxide and/or calcium oxide and/or yttrium oxide as coating layer such that to improve the quality of nickel or cobalt base superalloy cast product. In view of the prior art teaching as a whole, it would have been obvious to use the magnesium oxide, calcium oxide and yttrium oxide of EP '198 for forming the coating layers of JP '247 to obtain a better cast product. Further, JP '047 shows to produce an investment mold for casting titanium or titanium alloys. The process includes a step of immersing a wax pattern into a slurry containing refractory powder to form a face coating layer and then use the same refractory material to stucco the face coating layer to form a backup layer. The refractory powder consists one or two or more than two kinds among yttria, zirconia, calcia, and magnesia. It would have been obvious to use the investment mold of JP '247 for casting titanium or titanium alloys in view of JP '047. Since it is a common knowledge that the yttria is more expansive than zirconia, calcia and magnesia, etc. other refractory material, it would have

been obvious to use a lesser amount of yttria for forming the subsequent layer to reduce the cost. Further, it is a common practice to use fine particle for forming a face coating layer to produce a casting having good surface quality and coarser particle as stucco material for forming the second layer or as refractory material for forming slurry for forming subsequent layer to reduce the cost since it is more expensive to manufacture fine refractory particles. With respect to claim 14, it would have been obvious to vary the thick along different area of mold cavity such that to vary the heat transfer rate as designated.

5. Claims 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 4-300,047.

JP '047 shows to produce an investment mold for casting titanium or titanium alloys. The process includes a step of immersing a wax pattern into a slurry containing refractory powder to form a face coating layer and then use the same refractory material to stucco the face coating layer to form a backup layer. The refractory powder consists one or two or more than two kinds among yttria, zirconia, calcia, and magnesia. Thus, JP '047 substantially shows the invention as claimed except that it does not show to use less amount of but more coarsely grained yttria for forming the second layer. Since it is a common knowledge that the yttria is more expansive than zirconia, calcia and magnesia, it would have been obvious to use a lesser amount of yttria for forming the subsequent layer to reduce the cost. Further, it is a common practice to use fine particle for forming a face coating layer to produce a casting having good surface quality and coarser

particle as stucco material for forming the second layer or as refractory material for forming slurry for forming subsequent layer to reduce the cost since it is more expensive to manufacture fine refractory particle.

6. Applicant's arguments filed August 30, 2007 have been fully considered but they are not persuasive.

a. Applicant stated in the response that none of the prior art reference shows to use an investment mold having recited refractory material for casting titanium or titanium alloys. However, JP '047 shows that feature to be conventional.

b. Applicant further stated that none of the prior art reference shows the claimed second layer containing less amount of and more coarsely grained yttria. However, as stated supra, it is a common knowledge that the yttria is more expansive than zirconia, calcia and magnesia. Thus, it would have been obvious to use a lesser amount of yttria for forming the subsequent layer to reduce the cost. Further, it is a common practice to use fine particle for forming a face coating layer to produce a casting having good surface quality and coarser particle as stucco material for forming the second layer or as refractory material for forming slurry for forming subsequent layer to reduce the cost since it is more expensive to manufacture fine refractory particle.

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kuang Y. Lin whose telephone number is 571-272-1179. The examiner can normally be reached on Monday-Friday, 10:00-6:30,.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jonathan J. Johnson can be reached on 571-272-1177. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kuang Y. Lin/
Primary Examiner
Art Unit 1725

9-13-07